CLAIMS

What is claimed is:

1. A method, comprising:

securing a first plurality of electrochemical cell components into a first functioning sub-stack and a second plurality of electrochemical cell components into a second functioning sub-stack, the first and second functioning sub-stacks each having ends terminating in a structural component selected from a bipolar plate, a cooling fluid flowfield, and combinations thereof; and then

securing the first and second sub-stacks together.

2. The method of claim 1, further comprising:

testing the first and second functioning sub-stacks before securing the first and second functioning sub-stacks.

3. The method of claim 1, wherein the plurality of electrochemical cell components are selected from bipolar plates, bipolar grids, monopolar plates, monopolar grids, membrane and electrode assemblies, cooling plates, heating plates, and combinations thereof.

4. The method of claim 2, wherein the testing comprises measuring the electrical resistance through the sub-stack.

5. The method of claim 2, wherein the testing comprises leak-testing the sub-stack.

6. The method of claim 1, wherein the step of securing components into a functioning sub-stack includes banding a first perimeter tab of a first component in the sub-stack to a first perimeter tab of another component in the sub-stack.

7. The method of claim 5, wherein the step of securing components into a functioning sub-stack includes banding a second perimeter tab of the first component in the sub-stack to a second perimeter tab of the other component in the sub-stack.

8. The method of claim 1, wherein the first and second functioning sub-stacks are configured as an electrochemical device selected from a fuel cell, electrolyzer, oxygen concentrator, and combinations thereof.

9. The method of claim 1, wherein the first and second functioning sub-stacks include an ionically conducting medium.

10. The method of claim 8, wherein the medium is selected from a solid and a liquid.

11. The method of claim 8, wherein the medium is selected from a proton exchange membrane, an alkaline electrolyte, and a solid oxide electrolyte.

12. An electrochemical sub-stack, comprising:

electrochemical cell components assembled in a given order and alignment as required to form a functional sub-stack; and

two or more perimeter tabs extending from the components located at each end of the sub-stack, wherein the two or more perimeter tabs are aligned to establish alignment of the components.

13. The sub-stack of claim 12, further comprising:

two or more perimeter tabs extending from one of more of the components between the end components, wherein the tabs at each location on the perimeter are aligned with the tabs on the end components.

14. The sub-stack of claim 13, wherein the components between the end components are selected from a gas barrier, a bipolar plate, a monopolar plate, an end plate, a flow field, a membrane and electrode assembly, an electrode, electrocatalysts, a diffusion layer, and combinations thereof.

15. The sub-stack of claim 12, wherein the end components are selected from a gas barrier, a bipolar plate, a monopolar plate, an end plate, a flow field and combinations thereof

16. The sub-stack of claim 12, further comprising:

means for the securing the perimeter tabs of one end component with the perimeter tabs of the second end component, wherein securing the tabs holds the components securely together in the order and alignment.

17. The sub-stack of claim 16, wherein the means is selected from wire, string, rubber bands, rope, clamps and combinations thereof.

18. The sub-stack of claim 12, wherein there are three or more perimeter tabs, the perimeter tabs are arranged asymmetrically around the perimeter.

19. The sub-stack of claim 12, wherein each of the perimeter tabs around the perimeter of the end component are different in a way selected from color, shape, design, marking, thickness and combinations thereof.